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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/801,987	03/16/2004	Yuko Fukawa	81872.0057	2506

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EXAMINER	
TAI, XIUYU	

ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
12/08/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/801,987	FUKAWA ET AL.	
	Examiner	Art Unit	
	Xiuyu Tai	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *3/16/2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *5-12 and 23-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *5-12 and 23-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/25/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 5-33 have been considered but are moot in view of the new ground(s) of rejection necessitated by applicant's amendment.

2. In response to the argument that Tsuzuki et al does not teach the limitations as cited in the amended claim 5, it should be noted that Tsuzuki discloses another embodiment that teaches a photovoltaic device having a metal member 1006 connected to the backside of the adjacent photovoltaic device of the backside electrode power withdrawing member 1003 by soldering (Figure 10C and col. 14, line 6-11).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 5, 6, 23-25, and 32-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuzuki et al. (US 6,479,744) in view of Wood et al. (US Patent 6,150,717).

6. Regarding claims 5 and 25, Tsuzuki et al. disclose a method for producing solar cell module. The method of producing solar cell comprises steps of (1) providing photovoltaic device elements and each device having an upper electrode layer (i.e. a front surface electrode), amorphous silicon having photovoltaic function (i.e. a semiconductor substrate), and a lower electrode layer (Figure 10C; col. 13, line 8-12); (2) forming a metal member 1006 on the collector electrode 1005 (i.e. the front surface electrode) by heating and pressing a silver coated copper foil (Figure 10C; col. 13, line 55-65); (3) forming an electric withdrawing member 1003 (a soft copper foil) on the backside of the adjacent photovoltaic element by laser welding (Figure 10C; col. 13, line 36-39); and (4) connecting the metal member 1006 to the backside electric power withdrawing member 1003 by soldering (Figure 10C; col. 14, line 6-10).

Tsuzuki is silent about how the metal member 1006 and the electric power withdrawing member 1003 are soldered on the respectively surfaces and fails to teach that the two soldering layers have different melting points. However, Wood et al. discloses a method for mounting electrical interconnections with solder to the electrodes of the semiconductor device (col.1; lines: 15-24) and further discloses that one of the solder alloys can be a high temperature alloy and the other solder alloy a low temperature alloy and that it aids in the assembly of the semiconductor module (col.9;

lines: 6-22). Wood teaches that when an electrode is of a lower melting temperature and the solder is of a higher melt temperature, then the solder can be reflowed to form bonded connections (col. 9; lines: 61-67). The solder temperature is chosen between the melt temperature of the electrode and solder melt temperature to allow for the solder to soften and not enter the liquid phase, such that it will have a structural rigidity (col. 9; lines: 61-67). It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate two different solders with different melting points as suggested by Wood in order to aid in the assembly of the semiconductor in the method of Tsuzuki to produce a solar cell module.

7. Regarding claim 6, Wood teaches that one of the solder alloys can be a high temperature alloy and the other solder alloy a low temperature alloy and that it aids in the assembly of the semiconductor module (col.9; lines: 6-22), reads on the instant claim.

8. Regarding claims 23, 24, 32, and 33, Tsuzuki teaches a step of superposing soldering layers between electrodes and connection members (Figure 2 &3; col. 3, line 5-15), reads on the instant claims.

9. Claim 7 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuzuki et al. (US Patent 6, 479,744) and Wood et al. (US Patent 6,150,717) as applied to claims 6 and 25 above, and in further view of Nakahara et al (JP 2002/346788).

10. Regarding claims 7and 26, Tsuzuki/Wood fails to teach a lead-free first solder layer. However, Nakahara et al. discloses a lead-free, Sn-Ag based solder alloy that is

an environmentally sound (paragraphs 0003 and 0004) alternative to Pb-based solder while providing high joint dependability (paragraph 0006). The specific composition of the alloy is given in paragraph 0008, which lists both Ag and P as constituents. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the solder of Nakahara for connecting metal member/power withdrawing member to the electrodes of Tsuzuki/Wood in order to render the latter environmentally sound while providing high joint dependability.

11. Claims 8-10 and 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuzuki et al. (US Patent 6, 479,744) and Wood et al. (US Patent 6,150,717) as applied to claims 5 and 25 above, and in further view of Okada et al. (US Patent 6,571,469).

12. Regarding claims 8 and 27, Tsuzuki teaches that the metal member 1006 and the electric power withdrawing member 1003 are connected by soldering through collector electrodes 1005 (Figure 10c; col. 14, line 6-10), but fails to teach that the connections are through holes/ the common connection line at the connection areas between the connection members and electrodes. However, Okada et al. disclose a soldering method (Figure 26) for the manufacture of a modular board (Figure 1) with multiple electrodes. The method includes the use of through-holes 103 in order to bond electrodes more securely even when the board is subject to warpage (col.1, lines 63-65 & col. 2, lines 1-10). The through-holes allow molten solder to flow freely between the two electrodes to create a more reliable contact (col. 3, lines 45-48). Therefore, It would

have been obvious to one of ordinary skill in the art at the time of the invention to use the soldering method along with the through holes as suggested by Okada in order to bond the surface of the connection members to electrodes of Tsuzuki/Wood more reliably (i.e., more securely even when the electrodes are subject to warpage) by allowing molten solder to flow more freely between them.

13. Regarding claim 9 and 28, Tsuzuki teaches that the metal member 1006 and the electric power withdrawing member 1003 are connected by soldering through collector electrodes 1005 (Figure 10c; col. 14, line 6-10), but fails to teach that the connections are the common connection line at the connection areas between the connection members and electrodes. However, Okada et al. disclose a soldering method (Figure 26) for the manufacture of a modular board (Figure 1) with multiple electrodes. The method includes the use of through-holes 103 in order to bond electrodes more securely even when the board is subject to warpage (col.1, lines 63-65 & col. 2, lines 1-10). The through-holes allow molten solder to flow freely between the two electrodes to create a more reliable contact (col. 3, lines 45-48). Therefore, it would also have been obvious to one of ordinary skill in the art at the time of the invention to use the soldering method along with the through holes as suggested by Okada in order to bond the surface of the connection tab to the surface of the connection line of Tsuzuki/Wood more reliably (i.e., more securely even when the electrodes are subject to warpage) by allowing molten solder to flow more freely between the connection areas between the connection tabs and the connection line .

14. Regarding claim 10 and 29, Tsuzuki teaches that the metal member 1006 and the electric power withdrawing member 1003 are connected by soldering through collector electrodes 1005 (Figure 10c; col. 14, line 6-10), but fails to teach that the common connection line is provided with through holes at connection areas between the common connection line and the connection tabs. However, Okada et al. disclose a soldering method (Figure 26) for the manufacture of a modular board (Figure 1) with multiple electrodes. The method includes the use of through-holes (through holes, 103) in order to bond said electrodes more securely even when the board is subject to warpage (col.1, lines 63-65 & col. 2, lines 1-10). The through-holes allow molten solder to flow freely between the two electrodes to create a more reliable contact (col. 3, lines 45-48). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the soldering method along with the through holes as suggested by Okada in order to bond the surface of the connection tab to the surface of the connection line to each other more reliably (i.e., more securely even when the electrodes are subject to warpage) by allowing molten solder to flow more freely between them to the method of Tsuzuki/Wood for producing the solar cell module.

15. Claims 11, 12, 30, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuzuki et al. (US Patent 6, 479,744) and Wood et al. (US Patent 6,150,717) as applied to claims 5 and 25 above, and in further view of Mizukami et al. (US Patent 6,369,315) and Okada et al.(US Patent 6,571,469).

16. Regarding claims 11, 12, 30, and 31, Tsuzuki/Wood fails to teach a terminal box or output wires used to connect the solar cell elements to the terminals of that box. However, Mizukami et al. disclose a power generation system specifically for use with an array of photovoltaic modules (Figure 1). Mizukami et al. connect their photovoltaic array via bus bars 13 containing extensions 13b that are connected directly to an output fetching line (or a line that allows the power outputted by the cells to be used by the outside world) via a terminal box 17 (Figure 1; col. 5, lines 24-28) and the output wires (bus bar extensions, 13b) connect the solar cell elements with the terminals 18 of a terminal box 17 by means of solder 23 (Figure 1; col. 5, lines 32-35). Mizukami further indicates that using a terminal box allows the number of soldering spots in an output fetching wiring to be reduced (col. 2, lines 5-10). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to add the bus bar extensions and the terminal box as suggested by Mizukami in order to reduce the number of soldering spots in output fetching wiring while using the method of Tsuzuki /Wood.

Furthermore, Tsuzuki /Wood/Mizukami fails to teach that the output wires or the terminals of the box are provided with through holes at connection areas between the terminals and the output wires. However, Okada et al. disclose a soldering method (Figure 26) for the manufacture of a modular board (Figure 1) with multiple electrodes. The method includes the use of through-holes (through holes, 103) in order to bond said electrodes more securely even when the board is subject to warpage (col.1, lines 63-65 & col. 2, lines 1-10). The through-holes allow molten solder to flow freely

between the two electrodes to create a more reliable contact (col. 3, lines 45-48). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the soldering method along with the through holes suggested by Okada while providing the through holes either the output wires or the terminals of Tsuzuki/Wood/Mizukami in order to bond the surface of the wire to the surface of the terminals to each other more reliably (i.e., more securely even when the electrodes are subject to warpage) by allowing molten solder to flow more freely between them.

Conclusion

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Xiuyu Tai whose telephone number is 571-270-1855. The examiner can normally be reached on Monday - Friday, 7:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/X. T./
Examiner, Art Unit 1795

12/2/2008.

/Alexa D. Neckel/
Supervisory Patent Examiner, Art Unit 1795